

SEEPAGE REDUCTION IN OVERHEADED WATER TANK

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ABSTRACT

This paper represents the application of fibre for seepage reduction in over headed water tank. Structures like dams, retaining walls, canals water tanks are subjected to continuous seepage through there surfaces. These structures are constructed by concrete. Concrete is a material which cracks over time. And great seepage loss takes place through the surface of the walls. On the other hand to repair this seepage reconstruction of the water tanks becomes time consuming and uneconomical. In such cases some remedial techniques shall be used to reduce great seepage of water tank through the structure. Fibre meshes are mat like material that is applied to the surface of the structures which are used for water storage purpose. This paper deals with the efficiency of such materials on its application to surfaces of over-head tank with great seepage loss.

KEYWORDS: Seepage, Fibre Meshes, Flexible, Over-Head Tank, Glass Fibre

INTRODUCTION

Water is scares resource in nature. These days all over the globe water shortage is a major issue. India is tropical country which has greatly diversified distribution of water. On the other hand there are many storage reservoir and over headed water tank that are constructed to maintain the supply of water all over a particular area. But it has been observed that these are mainly constructed of concretes which are subjected to large amount of cracks as a result of which great amount of water is wasted daily through seepage. In case of dams if seepage is not controlled then there are chances of erosion of embankment, foundation etc.

Seepage is the slow escape of water through porous structure surface of material. To save this seepage loss it is not practically possible to reconstruct water tanks because it is time consuming and also resources consuming. There are many type of material or remedial materials that can help to reduce the seepage loose of water that is faced daily. And water can be saved. There are n number of fiber materials if are applied to the structure will reduce the seepage to a greater extent. There are different fibers meshes of different sizes that can be applied for reduction of seepage through water tanks etc. these are glass fiber mesh for water proofing, fiber mesh, plaster water proofing wire mesh, application of fiber cloth for water proofing etc.

METHODOLOGY

Methodology includes application of fibre meshes on the surface of the water tank which is an over-head water tank.

Application of Glass Fibre Mesh

Plaster glass fibre mesh or glass fibre mesh which is made up of woven glass fibre yarn as its basis mesh, and then coated by alkaline resistant latex. It has fine alkaline-resistant, high strength, etc. As an ideal engineering material in

construction, it is widely used for

- Wall warm keeping,
- Wall material
- Cement reinforcing,
- Surface decorating,
- Mosaic back mounting,
- Crack repairing and so on.

Following Picture Shows the Images of Glass Fibre Mesh Cloth

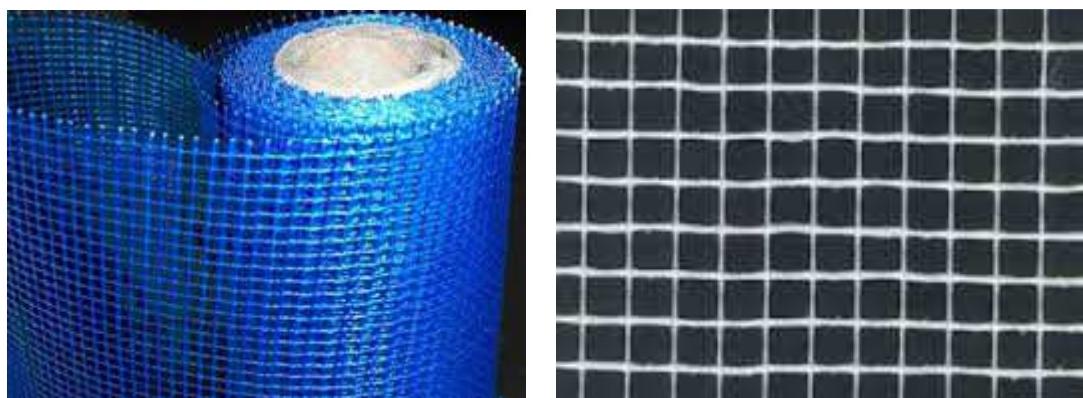


Figure 1: Structure of Glass Fibre Mesh

Properties of These Fibre Mesh

- High alkali resistance
- Glass fiber cloth is used for heat reservation systems
- It prevent seepage by protecting and preventing cracks
- These are flexible
- High tensile strength
- Durable for more than 50 years
- It has high elastic modulus more than 80.4 Gpa

The Procedure for Application is as Follows

- Use 160g / m² mesh fabric in insulator layer of reinforcement in the mortar
- By studying of the shrinkage and temperature changes provide a space to maintain movement between the layers
- This is to prevent crack and rupture due to shrinkage or temperature change.
- Apply the layer.

- Keep it to set for 48 hours

The water tank chosen for the treatment was a circular R.C.C water tank the dimensions are shown in figure

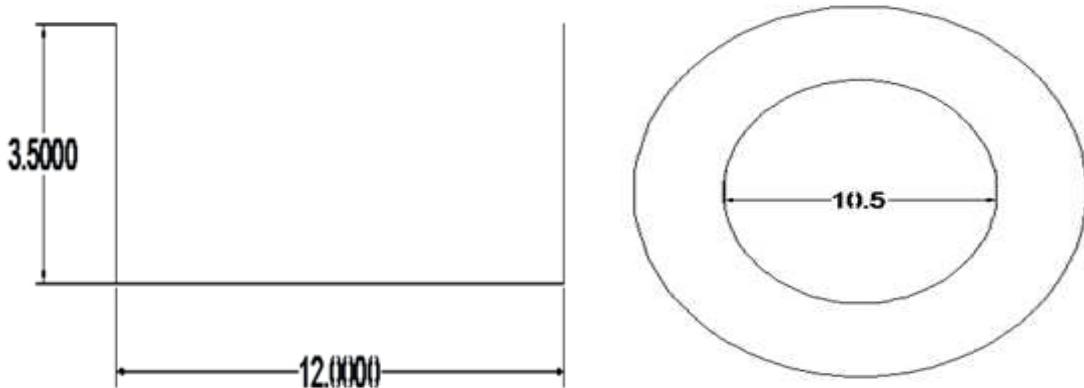


Figure 2: Shows Dimensional Details of Circular Water Tank.

As Per the Figure

Internal diameter of circular tank =10.5m

External diameter of tank=12m

Height of tank =3.5m

Thickness of wall= 1.5m

Volume of tank =115.45 cubic meter.

- The tank was first emptied.
- The surface of wall of excluding free board was applied the layer of fiber mesh.
- And left for 72 hours so that it gets completely fixed to the surface.
- Then the tank was supplied for the quantity of water it used to store is 115 cubic meter.

ANALYSIS

The circular R.C.C. water tank was under observation for 48 hrs. First of all the measures of seepage were taken. The initial volume of water supplied to the water is 115 cubic mt. Volume of water was measure after every 6 hrs.

- The tank was initially filled with water of 115cubic meter.
- Observations are made after every 6 hours of interval. For the decrease in the volume of water by decreased height of water level is measured.
- The lowering level of water is measure by using measuring tape.
- Likewise 7 observations are taken upto 48 hr.
- Now after the application of glass fiber mesh, tank was filled again with volume of water taken as 115 cubic meter.

- Then again seepage observations are made after each 6 hrs of interval.
- The observations are shown in Table 1

OBSERVATIONS

Table 1: Total Seepage Before and after Application of Glass Fibre

Serial Number	Time Interval (Hours)	After Application of Glass Fibre		Before Application of Glass Fibre	
		Volume of Water (Cubic Meter)	Total Seepage (Cubic Meter)	Volume of Water (Cubic Meter)	Total Seepage (Cubic Meter)
1	6	110	5	113.5	3.5
2	12	103	11	107.4	7.9
3	18	95	19	101.1	14
4	24	88.7	25.3	92	17.3
5	30	82	32	87.7	23
6	36	75.8	38.2	79.8	27
7	48	70	44	74.3	32.5

The total difference in seepage was found to be:

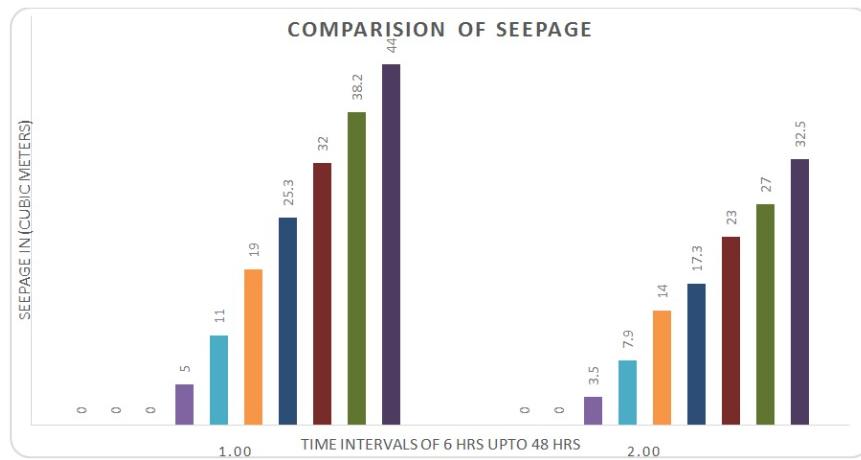
$$44 - 32.5 = 11.5 \text{ cubic meter}$$

$$\% \text{ Difference in seepage} = 32.5/44 \times 100 = 73.8 \approx 74\%$$

RESULTS

- The application of glass fiber mesh to water tank surface resulted in decrease in loss of water as 74%.
- The amount of seepage in water tank without fiber mesh is 44 cubic meter.
- The amount of seepage after application of fiber mesh is 32.8 cubic meter.
- The decrease in loss of water due to seepage resulted in more supply of water.
- Total saving in water is up to 11.5 cubic meters.
- It saved water up to 74 %
- It saved the maintenance cost up to 20%

Bar Chart Shows Total Seepage after and Before Treatment Respectively



Graph 1: Comparison of Seepage Value with Time

For every increase in 6 hrs of the interval the value has been seen to be increasing in the range of 70% to 75% or so.

The value of seepage of untreated R.C.C water tank is more than that of R.C.C tank applied by glass fiber mesh.

CONCLUSIONS

- As the technique helped in reduction of seepage of the existing water tank. It can help many other water tanks in local areas to reduce seepage which will as a whole reduce the loss of water of the city.
- There are many types of fibers available based on the suitability it can help in reducing seepage in storage reservoirs dams, canals also in dwelling units the wall tiles can be applied by using this technique to reduce dampness and seepage of water through it.
- In dams if this technique is used the phenomenon such as slippage of dam, overturning. Piping can be eliminated to 70%.
- Many types of water storage systems can be treated with these techniques to fix the most common problem of seepage without the total replacement of the existing structures.
- This is found to be an effective economical technique.
- Also the age of the applied is 50 years. So it is one time investment technique.

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